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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/649,528	08/28/2000	Chowdary Ramesh Koripella	CT00-013	8469

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EXAMINER	
LEUNG, JENNIFER A	
ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 09/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/649,528	KORIPELLA ET AL.
	Examiner	**Art Unit**
	Jennifer A. Leung	1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 July 2004 and 04 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-11,13-18,20 and 21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-11,13-18,20 and 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment submitted on June 4, 2004 and supplementary amendment submitted on July 8, 2004 have been received and carefully considered. Claims 2, 12 and 19 are cancelled. Claims 1, 3-11, 13-18, 20 and 21 remain active.

Response to Arguments

2. Applicant's arguments filed on June 4, 2004 have been fully considered but they are not persuasive. On page 8, last paragraph,

> "The Applicant asserts that paragraph [0030]-[0033] as referred to by the Examiner, describes the sintering of a catalyst support layer within a formed channel, to the plate itself. The disclosure fails to disclose *the sintering of the plurality of components* that make up the final assembly."

In addition, on page 9, second paragraph, to page 10, first paragraph,

> "The Applicant asserts that Furuya discloses a very cumbersome method of making the reformer unit that is comprised of *discrete layers that are simply packaged together. The end result is not sintered* as is the device claimed by the Applicant. The Applicant asserts that the system of Furuya uses discrete pieces of metal or ceramic and joins them together subsequent to the fabrication of channels having a catalyst disposed therein."
>
> "The disclosure of Furuya states the use of glass sealing, or the like, to join the different plates (ceramic, silicon) together… Additionally, some similar type of brazing is utilized for the laminating of metal pieces in Furuya. The Applicant asserts that due to the *simple laminating procedure of these discrete pieces*, the device remains susceptible to leakage of gas, liquid, etc."

On page 10, second paragraph, Applicant further states,

> "In contrast, the Applicant discloses forming the structures in the green state using multilayer ceramic technology so that subsequent to sintering, a monolithic structure is formed."

The Examiner respectfully disagrees and contends that Applicant's arguments are not commensurate with the language of the claims. Currently recited in claim 1, for instance, is:

> *A hydrogen generator comprising:*
>
> *a integral, sintered, monolithic ceramic carrier defining a fuel processor, the fuel processor including a vaporization zone and a reaction zone including a reforming catalyst;...*

The Examiner maintains that reforming and combusting plates **1** and **2** of Furuya (FIGs. 1, 2) structurally meet the claim of a hydrogen generator comprising an integral, sintered, monolithic ceramic carrier. As specified in sections [0030]-[0033], each plate **1, 2** comprises a catalyst support layer that may be formed of ceramic material according to the various methods indicated under items 1) through 4). The catalyst support layers themselves define the "integral, sintered, monolithic ceramic carrier," because the catalyst support layers are "integral" (i.e., they may contain both vaporization zone and reaction zone, and they are integral to the functioning of the hydrogen generator as a whole), "sintered" (see sections [0030]-[0033]), "monolithic" (i.e., each support layer representing a single stone), "ceramic" (i.e., the support layers contain alumina), and "a carrier" (i.e., they support the reforming and combustion catalysts). Note that the claims currently recite a hydrogen generator that *comprises* a structural component that is ceramic and sintered. The claims do not recite, however, that the hydrogen generator, itself, *consists of* a single, entirely sintered, ceramic structure. The transitional term "comprising", which is synonymous with "including," "containing," or "characterized by," is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. Se, e.g., *Genentech, Inc. V Chiron Corp.,* 112 F.3d 495, 501, 42 USPQ2d 1608, 1613 (Fed. Cir.1997). Any additional structural elements included in the apparatus of Furuya in combination with the sintered ceramic

components of plates **1** and **2** (i.e., additional materials such as glass wool, aluminum foil, brazing compounds, etc., that are associated with the specific lamination procedure for the plurality of layers) are therefore within the scope of the claims. Furthermore, the specific method for forming the apparatus (i.e., sintering prior to lamination vs. lamination prior to sintering, etc.) is not germane to the patentability of Applicant's apparatus over the prior art, as long as the prior art reference structurally reads on and anticipates the claims by containing each and every structural element as instantly recited in the claims.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1, 3, 5-8, 10, 11, 13-16, 18, 20 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Furuya et al. (JP 06-111838).

A. Independent claim 1 and corresponding dependent claims 3, 5-8 and 10

Regarding claims 1 and 10, Furuya et al. (see Figures, Abstract, and JPO Machine Translation) disclose an apparatus comprising:

a three-dimensional, multi-layer, integral, sintered, monolithic ceramic carrier structure (i.e., plates **1**, **2** comprising materials having high thermal conductivity, including sintered ceramic; FIG. 1, 2; sections [0017], [0030]-[0033]), the carrier structure further defining a fuel processor (i.e., a reforming machine **42**, comprising plates **1** and **2**; FIG. 8, 15; sections [0040]-[0043]; [0074]-[0077]) having a reaction zone including a reforming catalyst (i.e., reforming catalyst **6** of plate **1**; FIG. 1, 2; sections [0010]-[0014]) and inherently comprising a vaporization zone, as evidenced by the disclosed evaporation of

"poured" methanol within the fuel processor (i.e., Example 1; sections [0060]);

at least one channel formed in the ceramic carrier structure **1**, **2** for transporting a liquid fuel to the vaporization zone and a vapor in the reaction zone (i.e., passages **3**; Example 1);

an inlet channel for introducing the liquid fuel into the fuel processor (i.e., as schematically shown in FIG. 8, an inlet channel via piping **43** for supplying liquid fuel from tank **41'** to fuel processor **42**; as schematically shown in FIG. 15, an inlet channel via piping **80/43** for supplying fuel from tank **41** to fuel processor **42**); and

an outlet channel for transporting hydrogen enriched gas out of the fuel processor (i.e., as schematically shown in FIG. 8, an outlet channel via piping (not labeled) for transporting reformed gases out of fuel processor **42**; as schematically shown in FIG. 15, an outlet channel via piping (not labeled) for transporting reformed gases out of fuel processor **42** to fuel cell **45**).

Regarding claims 3 and 7, Furuya et al. disclose an integrated heat source (i.e., comprising combustion plates **2**) thermally coupled to the reaction and vaporization zones (i.e., reforming plates **1**) using thermally conductive channels or thermally conductive vias (i.e., thermally conductive passages **4**; FIG. 1, 2; sections [0010]-[0016]).

Regarding claims 5 and 6, Furuya et al. discloses the integrated heat source comprises a chemical heater including a catalyst and arranged to oxidize fuel (i.e., plates **2** including a combustion catalyst **5** coated on passages **4**; sections [0010]-[0016]), wherein the chemical heater further includes an air inlet (i.e., as schematically shown in FIG. 8, an air inlet (labeled in Japanese) to the piping **44** leading from fuel supply tank **41** to fuel processor **42**; and as schematically shown in FIG. 15, an air inlet **81** to the piping **44** leading from fuel supply tank **41**

to fuel processor **42**), and wherein the inlet channel **80/43** further comprises an opening to provide fuel to the chemical heater **2** (i.e., as best illustrated in FIG. 15, piping **80** comprises an opening to provide fuel to the combustion portion of reforming machine **42** via piping **44**).

Regarding claim 8, Furuya et al. disclose the vaporization and reaction zones comprise a plurality of parallel channels (i.e., passages **3** in plates **1**; FIG. 1, 2).

B. Independent claim 11 and corresponding dependent claims 13-16

Regarding claims 11, 15 and 16, Furuya et al. (see Figures, Abstract, and JPO Machine Translation) disclose an apparatus comprising:

a three-dimensional integral, sintered, monolithic multi-layer ceramic carrier structure (i.e., plates **1**, **2** comprising materials having high thermal conductivity, including sintered ceramic; FIG. 1, 2; sections [0017], [0030]-[0033]), the carrier structure further defining a fuel processor (i.e., a reforming machine **42**, comprising plates **1** and **2**; FIG. 8, 15; sections [0040]-[0043]; [0074]-[0077]) having a reaction zone including a reforming catalyst (i.e., reforming catalyst **6** of plate **1**; FIG. 1, 2; sections [0010]-[0014]) and inherently comprising a vaporization zone, as evidenced by the disclosed evaporation of "poured" methanol within the fuel processor (i.e., Example 1; sections [0060]);

the vaporization and the reaction zones comprising a plurality of parallel channels formed in the ceramic carrier for transporting a liquid fuel to the vaporization zone and a vapor in the reaction zone (i.e., passages **3** in plates **1**; FIG. 1, 2; Example 1);

the ceramic carrier further comprising an integrated heater (i.e., combustion plates **2**) thermally coupled to the reaction and vaporization zones using thermally conductive channels or thermally conductive vias (i.e., thermally conductive passages **4**; FIG. 1, 2; sections

[0010]-[0016]);

an inlet channel for introducing the liquid fuel into the fuel processor (i.e., as schematically shown in FIG. 8, an inlet channel via piping **43** for supplying liquid fuel from tank **41'** to fuel processor **42**; as schematically shown in FIG. 15, an inlet channel via piping **80/43** for supplying fuel from tank **41** to fuel processor **42**); and

an outlet channel for transporting hydrogen enriched gas out of the fuel processor (i.e., as schematically shown in FIG. 8, an outlet channel via piping (not labeled) for transporting reformed gases out of fuel processor **42**; as schematically shown in FIG. 15, an outlet channel via piping (not labeled) for transporting reformed gases out of fuel processor **42** to fuel cell **45**).

Regarding claims 13 and 14, Furuya et al. discloses the integrated heater comprises a chemical heater including a catalyst and arranged to oxidize fuel (i.e., plates **2** including a combustion catalyst **5** coated on passages **4**; sections [0010]-[0016]), wherein the chemical heater further includes an air port (i.e., as schematically shown in FIG. 8, an air inlet (labeled in Japanese) to the piping **44** leading from combustion fuel supply tank **41** to fuel processor **42**; as schematically shown in FIG. 15, an air inlet **81** to the piping **44** leading from supply tank **41** to fuel processor **42**), and wherein the inlet channel **80/43** further comprises an opening to provide fuel to the chemical heater **2** (i.e., as best illustrated in FIG. 15, piping **80** comprises an opening to provide fuel to the combustion portion of reforming machine **42** via piping **44**).

C. Independent claim 18 and corresponding dependent claims 20 and 21

Regarding claim 18, Furuya et al. (see Figures, Abstract, and JPO Machine Translation) disclose an apparatus comprising:

a three-dimensional integral, sintered, monolithic multi-layer ceramic carrier structure (i.e., plates **1**, **2** comprising materials having high thermal conductivity, including sintered ceramic; FIG. 1, 2; sections [0017], [0030]-[0033]), the carrier structure further defining a fuel processor (i.e., a reforming machine **42**, comprising plates **1** and **2**; FIG. 8, 15; sections [0040]-[0043]; [0074]-[0077]) having a reaction zone including a reforming catalyst (i.e., reforming catalyst **6** of plate **1**; FIG. 1, 2; sections [0010]-[0014]) and inherently comprising a vaporization zone, as evidenced by the disclosed evaporation of "poured" methanol within the fuel processor (i.e., Example 1; sections [0060]);

the vaporization and the reaction zones comprising a plurality of parallel channels formed in the ceramic carrier for transporting a liquid fuel to the vaporization zone and a vapor in the reaction zone (i.e., passages **3** in plates **1**; FIG. 1, 2; Example 1);

the ceramic carrier further comprising an integrated heater (i.e., combustion plates **2**; FIG. 1, 2) thermally coupled to the reaction and vaporization zones (i.e., reforming plates **1**; FIG. 1, 2) using thermally conductive structures (i.e., the walls defining combustion passages **4**);

an inlet channel for introducing the liquid fuel into the fuel processor (i.e., as schematically shown in FIG. 8, an inlet channel via piping **43** for supplying fuel from tank **41'** to fuel processor **42**; as schematically shown in FIG. 15, an inlet channel via piping **80/43** for supplying fuel from tank **41** to fuel processor **42**); and

an outlet channel for transporting hydrogen out of the fuel processor (i.e., as schematically shown in FIG. 8, an outlet channel via piping (not labeled) for transporting reformed gas out of fuel processor **42**; as schematically shown in FIG. 15, an outlet channel via piping (not labeled) for transporting reformed gas out of fuel processor **42** to fuel cell **45**).

Regarding claims 20 and 21, Furuya et al. discloses the integrated heater comprises a chemical heater including a catalyst and arranged to oxidize fuel (i.e., plates **2** including a combustion catalyst **5** coated on passages **4**; sections [0010]-[0016]), wherein the chemical heater further includes an air port (i.e., as schematically shown in FIG. 8, an air inlet (labeled in Japanese) to the piping **44** leading from combustion fuel supply tank **41** to fuel processor **42**; as schematically shown in FIG. 15, an air inlet **81** to the piping **44** leading from supply tank **41** to fuel processor **42**), and wherein the inlet channel **80/43** further comprises an opening to provide fuel to the chemical heater **2** (i.e., as best illustrated in FIG. 15, piping **80** comprises an opening to provide fuel to the combustion portion of reforming machine **42** via piping **44**).

Instant claims 1, 3, 5-8, 10, 11, 13-16, 18, 20 and 21 structurally read on the apparatus of Furuya et al.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 4, 9 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Furuya et al. (JP 06-111838) in view of Ghosh et al. (US 5,961,932).

Regarding claim 4, Furuya et al. further discloses the fuel processor (i.e., reforming machine **42** comprising reforming and combustion plates **1**, **2**, respectively) being integrally laminated with a fuel cell stack, wherein electricity generated by the stack may be used as, "a power source at the time of starting in a case of supplying hydrogen to a fuel-cell-fuel pole through a hydrogen ion conductive film from passage of a reforming machine," section [0056]. In such a configuration, the electricity from the fuel cell stack heats the fuel processor because

the, "reforming machine has electric conductivity," section [0056]. Although Furuya et al. does not specifically state, "a resistive heater that is electrically driven," the above configuration is substantially such. Furthermore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an electrically driven resistive heater for the integrated heat source in the apparatus of Furuya et al., since the use of resistive heaters for supplying heat to a reaction is well known in the art, and the substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958). Ghosh et al. evidences the conventionality of using a resistive heating element for heating a reaction zone by teaching a reaction chamber **34** being heated by an embedded heating element **38** driven by electrical leads **40** (column 5, lines 19-28; FIG. 3).

Regarding claims 9 and 17, although Furuya et al. are silent as to the vaporization and reaction zones comprising at least one serpentine channel, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate shape for the plurality of parallel channels (passages **3**; FIG. 1, 2) in the apparatus of Furuya et al., on the basis of suitability for the intended use, since changes in shape merely involves ordinary skill in the art. Furthermore, Ghosh et al. evidences the conventionality of providing channels of serpentine shape by teaching that, "It is instructive to note that a plurality of channels can be provided to handle more than two chemicals or alternatively the reaction chamber **34** can be made longer by configuring serpentine, complex, wavy, winding and angular meandering forms to allow for longer reaction time," (column 5, lines 15-19).

Conclusion

5. **THIS ACTION IS MADE FINAL.** As set forth in 37 CFR 1.136(a), a shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer A. Leung
September 14, 2004 JAL

Hien Tran

HIEN TRAN
PRIMARY EXAMINER